We acknowledge the reviewer for the useful comments that will improve the paper. In the following, there are our answer to each comment.

Reviewer #1

This study uses ground-based measurements in Italy as to evaluate the GHI estimations from MSG and RAMS in hourly basis. Then, a correction technique was performed in order to improve the comparison results.
The scientific quality and presentation of the paper is very good and with some minor technical corrections and revisions, it could be a valuable publication in the AMT journal.
First of all the MOS correction needs to briefly described in the ”Data and Methods” section in order to provide a connection with the application results in sub-section 3.3.

-We will move the MOS description in the “Data and Methods” section.

The authors could provide some references for the uncertainties in cloud-properties and MACC outputs, and discuss the sensitivity of these parameters to the MSG-GHI evaluated values.

We will comment on the uncertainty in cloud properties and MACC output, adding some references on the subject. We will write:

“The retrieval of cloud properties can be associated with large uncertainties, in particular due to horizontal inhomogeneity (e.g., Coakley et al., 2005). However, subsequently derived irradiances (such as SICCS GHI) have relatively much smaller uncertainty due to compensation of errors in forward and inverse radiative transfer calculations (Greuell et al., 2013; see also Kato et al., 2006). Uncertainties in MACC reanalysed aerosol properties contribute to errors in retrieved clear-sky GHI but these errors are considerably smaller than those for cloudy skies (Greuell et al., 2013).”

The same literature-based uncertainty and sensitivity analysis need to be discussed for the RAMS, as to directly connect with the evaluation results presented, by providing comparable specific ranges and values as well.

We acknowledge the reviewer and Stephen Saleeby for this specific comment on the RAMS model. We will clarify the uncertainties that are expected with our version of the RAMS model, considering recent developments to the model as well as results obtained with different models.

“The results of this paper are representative of the current operational implementation at ISAC-CNR. There have been, however, recent improvements to the RAMS model (CSU-RAMS, http://vandenheever.atmos.colostate.edu/vdhpage/rams.php) that will be explored in future studies to improve the GHI forecast. The errors of the RAMS forecast for the GHI can be divided in three main components: a) errors in the prediction of the cloud coverage; b) errors in the simulation of the interaction between the radiation and the clouds; c) the aerosol effects on the GHI.

As shown by the results of this and others papers, the relative error when the cloud coverage is not well represented is of the order of the GHI (100%). Errors by both physical and numerical parameterizations of the model, but also errors in the initial and boundary conditions contribute to this issue. In particular, the microphysical scheme influences the whole simulation through a multitude of dynamic, radiative, thermodynamic and microphysics processes. The WSM6 scheme used in this paper is a single-moment scheme, predicting the mixing ratios of six hydrometeors (vapor, cloud, rain, graupel, ice, snow). The WSM6 gave better performance compared to other single-moment microphysics schemes included in RAMS for twenty cases over Italy characterized by widespread convection and, for this reason, is used in the operational implementation at ISAC-CNR. However, the inability of single-moment schemes to allow the number concentration and mean diameter of hydrometeors to vary independently limits their ability to simulate clouds with characteristics consistent with observations across a wide range of atmospheric conditions. Also, the sensitivity of these schemes to fixed parameters as, for example, the number concentration of the hydrometeors, is high (Igel et al., 2014).

When both the mixing-ratio and number concentration can be predicted, as in double-moment schemes, the description of the physical processes as condensation, collision-coalescence, and sedimentation is improved. For this reason, double-moment schemes outperform single-moment schemes as shown in several studies (Igel et al., 2014 and references therein).

The CSU-RAMS model includes a double-moment microphysics scheme (Meyers et al., 1997) that could improve the prediction of the cloud coverage and will be considered in future studies.

Also, the cumulus parameterization scheme has an important role on the NWP forecast, especially for cloud prediction. In addition to the Kuo scheme, used in this paper for the first domain, RAMS implements the Kain-Fritsch scheme (Castro et al., 2005). This scheme will be used in future studies to assess the sensitivity of the performance to the choice of the cumulus parameterization scheme.

Another important point to consider for improving the model performance of the GHI forecast is the change in the optical properties of the clouds when the liquid and ice phases are considered in the radiative scheme (Harrington et Olsson, 2001; Sun and Shine, 1995). The Chen and Cotton scheme (Chen and Cotton, 1983) used in this paper, while fast and efficient from the computational point of view, considers the total condensate in the atmosphere but not the phase of the water (i.e. ice , liquid or mixed). Numerical and observational experiments (Harrington et Olsson, 2001; Sun and Shine, 1995) shows that the impact of the water phase is significant for the computation of the GHI because the absorption and emissions are largely reduced in ice compared to liquid path with the same water path, leading to a surface net radiative impact of 60 W/m^2 for a case of an Artic Stratus Cloud simulated by RAMS.

Finally, our radiative scheme neglects the impact of the aerosols. This impact, however, can be very important. For example Lara-Fanego et al. (2011) show that the overestimation of the GHI by WRF over Andalucia in clear sky conditions was caused by the underestimation of the aerosol optical depth (AOD), which was assumed 0.1 for their experiments. Zamora et al. (2005) showed that a doubling of the AOD considered in the Dudhia scheme (Dudhia, 1989) was responsible for a decrease of the

GHI of about 100 W/m2 at the solar noon. Kosmopulos et al. (2017) investigates the impact of an extremely high dust event (maximum AOD 3.5), occurred from 30 January to 3 February 2015 over Greece. For this event, they found an attenuation of the GHI up to 40-50 %, being the attenuation almost equally distributed in the UV, visible and infrared portion of the spectrum. They also show that, for climatological conditions, the attenuation of the GHI by the aerosol load is less than 10%. Considering the above results and the fact that the RMSE statistic used in this paper is sensitive to large errors, an important impact of the aerosols is expected for the statistics of this paper. The Harrington et al. (1997) radiation scheme is aerosol sensitive, is available in CSU-RAMS, and will be tested in future studies."

Finally, the conclusions section need to be merged into some additional general findings, highlighting the innovation and value of this study.

Considering this comment and that of the second reviewer about the conclusions, the "Conclusion" section ("Summary and Conclusions" in the revised version) will be shortened about the results of this paper, while the results of the paper will be compared with similar studies in other Mediterranean countries. In general, the results of this paper span a wider performance compared to other studies, because of the very different climatic characteristics of the stations. Also, the above discussion on the RAMS model will be included in the "Summary and Conclusions" section.

Overall, the presented techniques are scientifically sufficient, the results are well determined and falls into the scope of AMT, so I believe that after the above minor corrections, the paper can be published.